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SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC  
2100 Pennsylvania Avenue, N.W.  
Washington, DC 20037

EXAMINER

RUDE, TIMOTHY L

ART UNIT PAPER NUMBER

2871

DATE MAILED: 10 24 2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/738,979

Applicant(s)

UMEMOTO ET AL.

Examiner

Timothy L Rude

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2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on 10 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-10 and 12-18 is/are rejected.
- 7) ☐ Claim(s) 11 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Claims*

1. Claims 1, 6, and 12 are amended with no new matter added, and the rejection under 35 U.S.C. 112, second paragraph, is withdrawn. Claims 15-18 are added.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

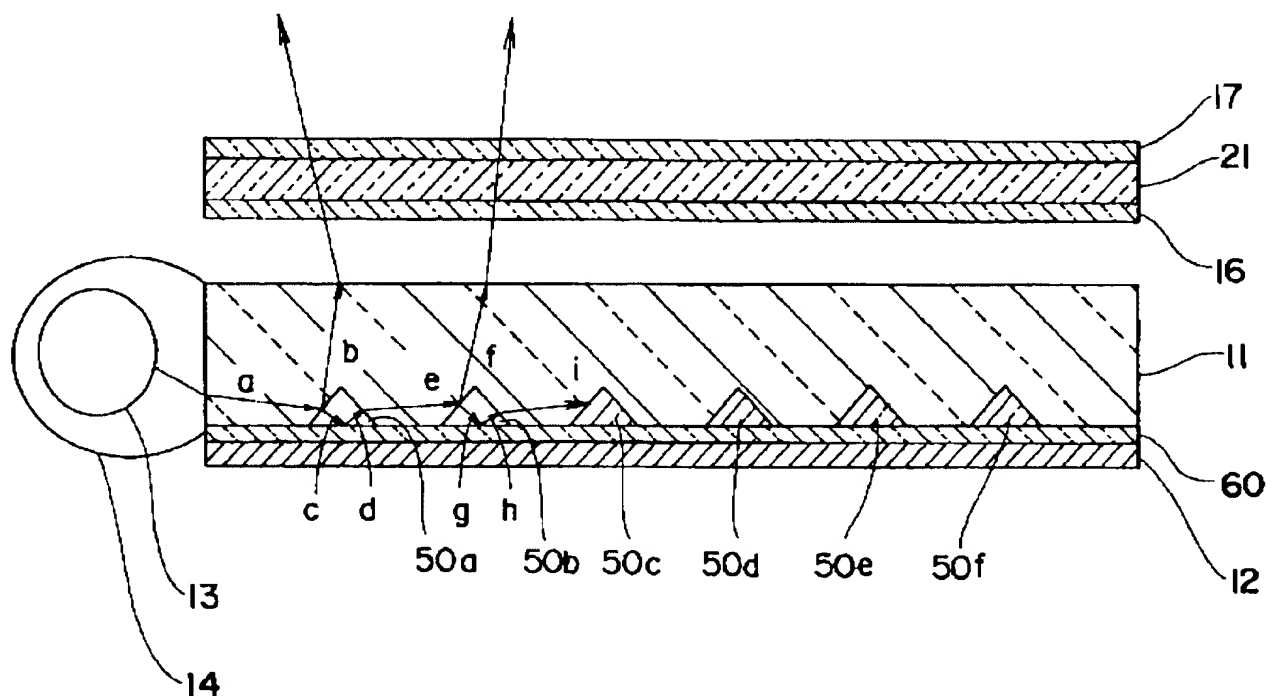
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuuki et al (Yuuki) USPAT 6,147,725 in view of Margerum et al (Margerum) USPAT 5,099,343.

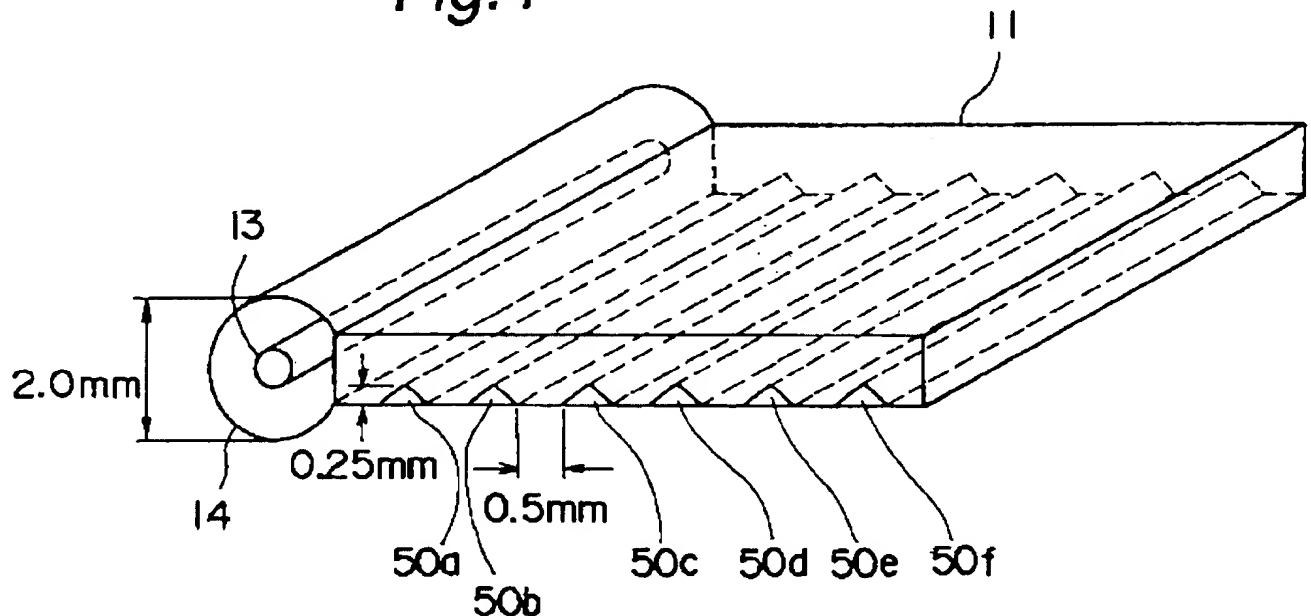
As to claims 1 and 15, Yuuki discloses in Figures 2, 3, and 4 (col. 5, line 19 through col. 8, line 52, especially col. 5, lines 45-55) a liquid-crystal display (LCD) device comprising: a transmission type liquid-crystal display panel, 21, including a liquid-crystal cell; a light source, 13, disposed on at least one side of said liquid-crystal display panel; and a light guide plate, 11, disposed on a back side, opposite to a visual side, of said liquid-crystal display panel and having a polarization rotating film, 60, with

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equilateral prism reflecting members, 50a through 50f, (Applicant's optical path changing sheet with optical path changing slopes) by which incident light from said light source is reflected toward said visual side of said liquid-crystal display device (ray traces b and f).

*Fig.3*

*Fig.4*



Yuuki does not explicitly disclose a light disposed on at least one edge (Applicant's side surface) of the liquid-crystal display (LCD) panel.

Margerum teaches the use of direct edge lighting of the LCD without the use of a light guide plate in Figure 1, to improve contrast under bight ambient light conditions (col. 2, lines 40-45) relative conventional back-illumination.

Margerum is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add direct edge lighting of the LCD to improve contrast under bight ambient light conditions relative conventional back-illumination.

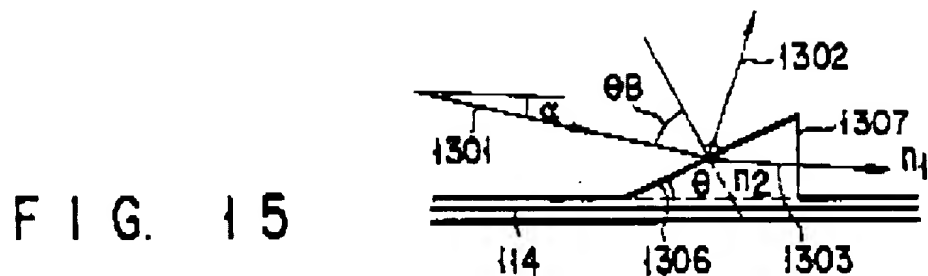
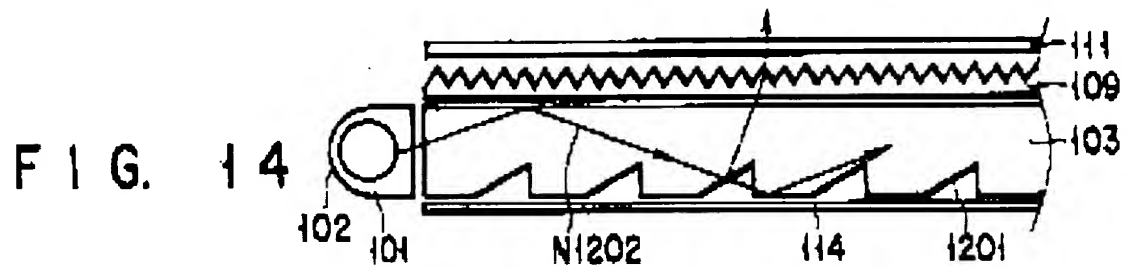
Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Yuuki with the direct edge lighting of Margerum to improve contrast under bight ambient light conditions relative conventional back-illumination.

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As to claim 2, Yuuki discloses in Figures 2, 3, and 4 (col. 5, line 19 through col. 8, line 52, especially col. 5, lines 19-22) the liquid-crystal display device, wherein said liquid-crystal display panel further includes a polarizer, 16 and 17, disposed on one or each side of said liquid-crystal cell, 21.

3. Claims 1, 13, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taira et al (Taira) USPAT 5,712,694 in view of Margerum et al (Margerum) USPAT 5,099,343.

As to claims 1 and 15, Taira discloses in Figures 14 and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 13, lines 60-67) a liquid-crystal display device (Title and Abstract) comprising: a transmission type liquid-crystal display panel including a liquid-crystal cell; a light source, 101, disposed on at least one side of said liquid-crystal display panel; and a light-guiding plate, 103, (Applicant's optical path changing sheet) disposed on a back side opposite to a visual side of said liquid-crystal display panel and having optical path changing slopes, 1201, by which incident light from said light source is reflected toward said visual side of said liquid-crystal display device (ray trace 1302).



Taira does not explicitly disclose a light disposed on at least one edge (Applicant's side surface) of the liquid-crystal display (LCD) panel.

Margerum teaches the use of direct edge lighting of the LCD without the use of a light guide plate in Figure 1, to improve contrast under bright ambient light conditions (col. 2, lines 40-45) relative conventional back-illumination.

Margerum is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add direct edge lighting of the LCD to improve contrast under bright ambient light conditions relative conventional back-illumination.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Taira with the direct edge lighting of Margerum to improve contrast under bright ambient light conditions relative conventional back-illumination.

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As to claim 13, Taira discloses in Figures 14 and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 14, line 65 through col. 15, line 2 and col. 8, lines 34-41) the liquid-crystal display device, further comprising a reflection layer, 114, disposed on a back side opposite to a visual side of said optical path changing sheet.

As to claim 14, Taira discloses in Figures 14 and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 14, line 65 through col. 15, line 2 and col. 8, lines 4-13) the liquid-crystal display device, wherein said reflection layer adheres (col. 8, lines 34-37) closely to a surface of said optical path changing sheet on which said optical path changing slopes are formed.

4. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taira in view of Margerum, as applied to claim 1 above.

As to claims 7 and 8, Taira discloses in Figures 14 and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 14, lines 43-64) the liquid-crystal display device, wherein said optical path changing sheet includes repetitive prismatic structures having optical path changing slopes facing said light source at an inclination



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angle,  $\theta$ , of from 3 to 56 degrees (includes Applicant's 35 to 48 degrees of claim 7 and includes Applicant's 38 to 45 degrees of claim 8) with respect to said sheet plane.

Taira is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add an inclination angle of from 35 to 48 degrees or from 38 to 45 degrees to reflect light at Brewster's angle (col. 14, lines 43-54) towards the LCD and the viewer.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the optical path changing sheet with the inclination angles of Taira.

As to claim 9, Taira discloses in Figures 14 and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 14, lines 43-64) the liquid-crystal display device, wherein each of said prismatic structures of said optical path changing sheet is constituted by a concave portion shaped like a saw-tooth (Applicant's triangle in section) (col. 13, lines 51-54).

As to claim 10, Taira discloses in Figures 5B, 14, and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 14, line 65 through col. 15, line 2) the liquid-crystal display device, wherein said prismatic concave portions are constituted by continuous grooves extended from one end of said sheet to the other end of said sheet in a ridgeline direction parallel to or inclined to a side surface of said liquid-crystal display panel on which said light source is disposed.

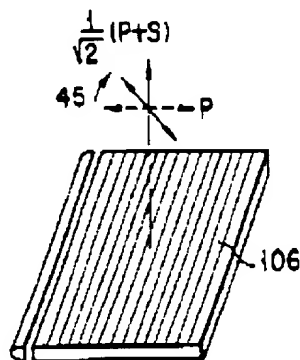


FIG. 5B

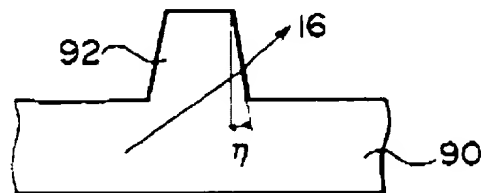
5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taira in view of Margerum, as applied to claims 1 and 7 above, in view of Miyashita et al (Miyashita) USPAT 6,011,602.

As to claim 12, Taira in view of Margerum discloses in Figures 14 and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 14, lines 43-64) the A liquid-crystal display device, wherein each of said prismatic structures of said optical path changing sheet is constituted by a concave portion and having two or more optical path changing slopes facing said light source.

Taira in view of Margerum does not explicitly disclose convex prismatic structures shaped substantially like a trapezoid (Applicant's, like a rectangle) in section.

Miyashita teaches in Figure 10A the use of convex prismatic structures shaped substantially like a trapezoid in section to make manufacture by injection molding easier (col. 15, lines 58-67).

FIG. 10A



Miyashita is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use convex prismatic structures shaped substantially like a trapezoid in section to make manufacture by injection molding easier.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the optical path changing sheet of Taira in view of Margerum with the convex prismatic structures shaped substantially like a trapezoid in section of Miyashita.

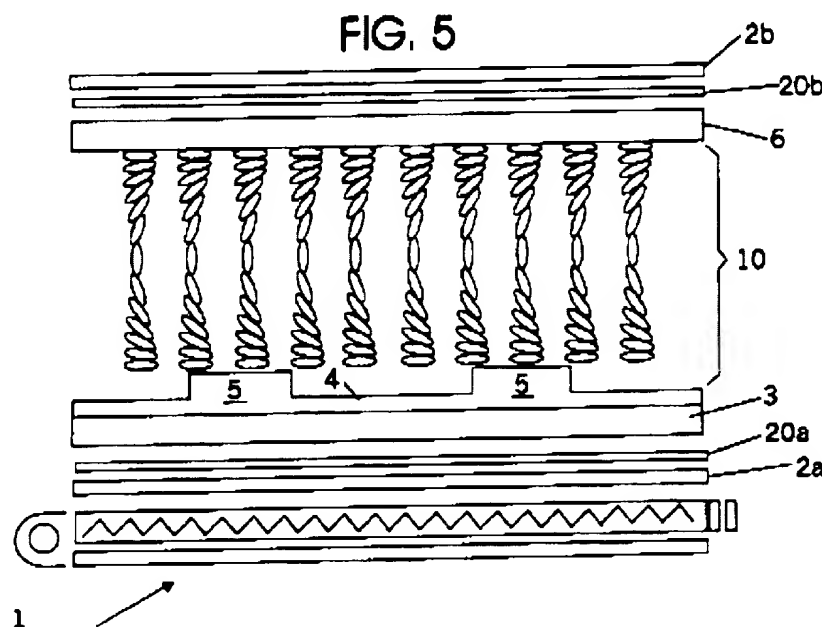
6. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuuki in view of Margerum, as applied to claims 1 and 2 above, in view of Nakamura, USPAT 6,137,554.

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As to claim 3, Yuuki in view of Margerum discloses in Figures 2, 3, and 4 (col. 5, line 19 through col. 8, line 52, especially col. 5, lines 19-22) the liquid-crystal display device according to claim 2.

Yuuki in view of Margerum does not explicitly disclose at least one retarder disposed between said liquid-crystal cell and said polarizer.

Nakamura teaches in Figure 5 a back lighted transmission type LCD with at least one phase difference compensation layers, 20a and 20b (Applicant's, retarder) (col. 5, lines 20-34) disposed between said liquid-crystal cell, 10, and said polarizer, 2a and 2b.



Nakamura is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use at least one retarder disposed between

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said liquid-crystal cell and said polarizer to compensate for the birefringence of the liquid crystal layer.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Taira in view of Margerum with the retarders of Nakamura.

As to claim 4, Yuuki in view of Margerum discloses in Figures 2, 3, and 4 (col. 5, line 19 through col. 8, line 52, especially col. 5, lines 19-22) the liquid-crystal display device according to claim 1.

Yuuki in view of Margerum does not explicitly disclose cell substrates for supporting said liquid-crystal cell, said cell substrates being made of an optically isotropic material.

Nakamura teaches in Figure 5 a back lighted transmission type LCD with substrates, 3 and 6, made of glass (Applicant's optically isotropic material) (col. 5, lines 24 and 25) to hold the liquid crystal material.

Nakamura is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use substrates made of glass (Applicant's optically isotropic material) to hold the liquid crystal material.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Yuuki in view of Margerum with the glass substrates of Nakamura.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yuuki and Margerum in view of Nakamura as applied to claim 4, and further in view of Taira.

As to claim 5, Yuuki and Margerum in view of Nakamura discloses the liquid-crystal display device according to claim 4 comprising an optical path changing sheet with the slope-forming surface of said optical path changing sheet located on said back side opposite to said visual side of said liquid-crystal display panel.

Yuuki and Margerum in view of Nakamura does not explicitly disclose an adhesive bonded LCD.

Yuuki and Margerum in view of Nakamura does not explicitly disclose an optical path changing sheet having optical path changing slopes each inclined at an inclination angle in a range of from 35 to 48 degrees with respect to a sheet plane, and a refractive index difference not larger than 0.15 between said optical path changing sheet and one of said cell substrates nearest to said optical path changing sheet.

Taira discloses an LCD device wherein a reflection layer adheres (col. 8, lines 34-37) closely to a surface of said optical path changing sheet on which said optical path changing slopes are formed.

Taira discloses in Figures 14 and 15 (embodiment 11, col. 13, line 50 through col. 15, line 16, especially col. 14, lines 43-64) an optical path changing sheet with an index of refraction of 1.5 that includes repetitive prismatic structures having optical path changing slopes facing said light source at an inclination angle,  $\theta$ , of from 3 to 56

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degrees (includes Applicant's 35 to 48 degrees) with respect to said sheet plane. Note: typical LCD glass substrates have an index of refraction well within a range of 1.4 to 1.6, inherent property of suitable substrate glasses, e.g.,  $\text{SiO}_2$  has a refractive index of 1.44968.

Taira is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add an inclination angle of from 35 to 48 degrees to reflect light at Brewster's angle (col. 14, lines 43-54) towards the LCD and the viewer.

Taira is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to provide a difference in refractive index not larger than 0.15 between said optical path changing sheet and one of said cell substrates nearest to said optical path changing sheet to make use of generally available suitable materials, e.g., glass, and reduce unwanted scattering of the light and improve polarization efficiency (col. 12, lines 25-32).

Taira is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to adhesive bond the layers of the assembly to prevent unwanted scattering of the light and improve polarization efficiency (col. 12, lines 25-32).

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD device of Yuuki and Margerum in view of Nakamura with the adhesive bonded optical path changing sheet with prism inclination angles of from 35 to 48 degrees and a refractive index difference not larger than 0.10 (Applicant's, 0.15) between said optical path changing

sheet and one of said cell substrates nearest to said optical path changing sheet of Taira.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yuuki and Margerum in view of Nakamura and Taira as applied to claim 5, and further in view of Koike USPAT 6,322,225.

As to claim 6, Yuuki and Margerum in view of Nakamura and Taira discloses the liquid-crystal display device according to claim 5, wherein the refractive index difference is not larger than 0.10 between said optical path changing sheet and one of said cell substrates nearest to said optical path changing sheet.

Yuuki and Margerum in view of Nakamura and Taira does not explicitly disclose a refractive index difference that is not larger than 0.15 between said adhesive layer and said nearest liquid-crystal cell substrate.

Koike teaches (col. 15, lines 12-20) the use of an adhesive that has a refractive index that is as much as possible the same as that of the light scattering guide (and therefore the liquid crystal substrates also) to prevent generation of brightness irregularity with coloring phenomenon or stripe shape due to optical interference phenomenon.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD device of Yuuki and Margerum in view of Nakamura and Taira with the adhesive bonded optical path



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changing sheet with a refractive index as much as possible the same as (Applicant's, difference not larger than 0.15) the nearest liquid-crystal cell substrate of Koike.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yuuki and Margerum in view of Yokota et al (Yokota) USPAT 5,764,315.

As to claims 16-18, Yuuki and Margerum do not explicitly disclose the thickness of the optical path changing sheet.

Yokota teaches in Figures 17-21, the use of a light adjusting sheet (Applicant's optical path changing sheet) that is 50-300  $\mu\text{m}$  thick (col. 6, lines 45-49; col. 15, lines 34-40; and col. 16, lines 59-67) (Overlaps Applicant's less than 300 $\mu\text{m}$ ; between about 5 $\mu\text{m}$  and about 200 $\mu\text{m}$ ; and between about 10 $\mu\text{m}$  and about 100 $\mu\text{m}$ ) to concentrate light distribution in the forward direction of the screen with no Moire fringes (col. 4, lines 25-29).

Yokota is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add an optical path changing sheet that is 50-300  $\mu\text{m}$  thick to concentrate light distribution in the forward direction of the screen with no Moire fringes.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of Yuuki and

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Margerum with the an optical path changing sheet that is 50-300  $\mu\text{m}$  thick of Yokota to concentrate light distribution in the forward direction of the screen with no Moire fringes.

### ***Allowable Subject Matter***

10. Claim 11 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As to claim 11, relevant prior art of record did not disclose, alone or in combination, the liquid-crystal display device according to claim 7, wherein said prismatic concave portions are constituted by discontinuous grooves each of which has *a length of not smaller than five times as large as the depth* of said groove and in which a direction of a length of said groove is substantially parallel to aside surface of said liquid-crystal display panel on which said light source is disposed.

### ***Response to Arguments***

11. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

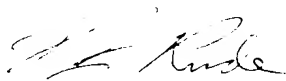
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**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy L Rude whose telephone number is (703) 305-0418. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William L Sikes can be reached on (703) 308-4842. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.



Timothy L Rude  
Examiner  
Art Unit 2871

TLR  
October 10, 2002



TOANTON  
PRIMARY EXAMINER